ONTARIO MINISTRY OF ENVIRONMENT
36936000025475

1966 OPERATING SUMMARY

ELMIRA

water pollution control plant

TD
367
.A56
E455
1966
MOE

ONTARIO WATER RESOURCES COMMISSION

Division of Plant Operations

TD
367
.A56
E455
1966

Elmira : water pollution control plant.
82205

ONTARIO WATER RESOURCES COMMISSION
OFFICE OF THE GENERAL MANAGER

Members of the Town of Elmira Local Advisory Committee,
Elmira, Ontario.

Gentlemen:

We are pleased to submit to you the 1966 Operating Summary for the Elmira Water Pollution Control Plant, OWRC Project No. 61-S-96.

It is hoped that our joint participation in efforts to combat water pollution will have even more success in the coming year.

Yours very truly,

D. S. Caverly,
General Manager.

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ONTARIO WATER
RESOURCES COMMISSION

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TD
227
E55
W38
1966
MOE

ONTARIO WATER RESOURCES COMMISSION
801 BAY STREET
TORONTO 5

J. A. VANCE, LL.D.
CHAIRMAN

J. H. H. ROOT, M.P.P.
VICE-CHAIRMAN

D. S. CAVERLY
GENERAL MANAGER

W. S. MacDONNELL
COMMISSION SECRETARY

General Manager,
Ontario Water Resources Commission.

Dear Sir:

I am happy to present you with the 1966 Operating Summary for the Elmira Water Pollution Control Plant, OWRC Project No. 61-S-96.

The report offers a concise summary of operating data for the year and comparisons with previous years where these are applicable and significant.

Yours very truly,

B C Palmer

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

FOREWORD

● This operating summary contains complete information on the management of the project during 1966. It contains a concise review of the year's plant operation, significant financial details, and a visual presentation in graphs and charts of technical performance.

The information will be of value to interested parties in assessing the adequacy of the project at this time and its ability to meet future requirements.

The report is the result of co-operation by several groups within the Division of Plant Operations. These include the statistics section and the technical publications section. The Division of Finance and the draughting section of the Division of Sanitary Engineering were also closely associated with its publication.

The Regional Operations Engineer, however, has had the primary responsibility for the content, and will be happy to answer any questions regarding it.

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Environment Ontario
Laboratory Library
125 Resources Rd.
Etobicoke, Ontario M9P 3V6
Canada

ELMIRA

water pollution control plant

operated for

THE TOWN OF ELMIRA

by the

ONTARIO WATER RESOURCES COMMISSION

CHAIRMAN: Dr. James A. Vance

VICE-CHAIRMAN: J. H. H. Root, M.P.P.

COMMISSIONERS

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D. A. Moodie
L. E. Venchiarutti

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ASSISTANT GENERAL MANAGERS

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K. H. Sharpe
F. A. Voege
A. K. Watt

COMMISSION SECRETARY

W. S. MacDonnell

DIVISION OF PLANT OPERATIONS

DIRECTOR: B. C. Palmer

Assistant Director: C. W. Perry
Regional Supervisor: D. A. McTavish
Operations Engineer: B. W. Hansler

801 Bay Street Toronto 5

'66 REVIEW

A total of 202.882 million gallons of sewage was treated during the year at a total cost of \$45,931.52. The cost per million gallons and the cost per pound of BOD removed were \$226.40 and \$0.10 respectively.

Difficulty was experienced in treating the industrial wastes received at the plant. The average effluent BOD and suspended solids concentrations of 60 ppm and 76 ppm were greater than the OWRC objectives for each of 15 ppm. During the latter part of the year, there were fewer problems created by fibres in the influent.

Following the clean-out and repair of the digester, it was seeded prior to addition of sludge from the primary clarifiers, but no significant amount of methane gas was produced during the year.

Close laboratory control of the aeration section was practised, and on the basis of these daily tests, raw sludge was on occasion added to feed the organisms.

During the year, Naugatuck Chemicals Ltd. became known as Uniroyal, Chemical Division Limited.

PROJECT COSTS

NET CAPITAL COST (Estimated)		$584,377.88
DEDUCT - Portion Financed by CMHC (Estimated)	$388,449.01	
- Payments from Municipalities	100,085.00	488,534.01
Long Term Debt to OWRC		$ 95,843.87

Debt Retirement Balance at Credit (Sinking Fund) December 31, 1966	$ 4,038.95

Net Operating	$ 45,931.52
Debt Retirement	2,020.00
Reserve	3,846.90
Interest Charged	9,210.28
TOTAL	$ 61,008.70

RESERVE ACCOUNT

Balance at January 1, 1966	$ 4,013.10
Deposited by Municipality	3,846.90
Interest Earned	300.36
	$ 8,160.36
Less Expenditures	2,784.25
Balance at December 31, 1966	$ 5,376.11

MONTHLY OPERATING COSTS

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	* SUNDRY	WATER
JAN	2425.41	1198.33	571.20	130.13	328.83		7.64			7.00	182.28
FEB	3186.09	1125.35	529.52	128.23	339.82		434.33	214.82	49.03	364.99	
MARCH	3154.47	1163.40	359.51	164.33	328.39	448.06	65.28	86.00	17.18	353.20	169.12
APRIL	3713.86	1516.74	1381.60	175.03	358.53		70.28		21.62	190.06	
MAY	3333.51	1162.80	989.95	203.03	324.23		57.75	84.61	101.89	245.33	163.92
JUNE	4195.94	2080.30	633.22	170.93	246.55	228.38	215.85	19.24	185.14	416.33	
JULY	4677.27	1159.66	692.82	50.85	261.70		52.24	205.01	126.93	1933.77	194.29
AUG	2766.18	1317.38	658.20	8.45	227.84	228.38	139.60		40.89	145.44	
SEPT	4004.06	1834.99	872.59	103.90	229.92		290.65	8.00	163.57	337.60	162.84
OCT	7437.60	1280.09	406.30	110.69	249.67		77.71	128.51	1339.71	3844.92	
NOV	4070.31	1196.10	354.76	143.43	240.32	239.93	643.68	368.22	510.66	239.36	133.85
DEC	2966.32	1339.63	62.09	156.73	256.95		381.30	139.66	297.93	332.53	
TOTAL	45931.52	16374.77	7511.76	1545.73	3392.75	1144.75	2436.31	1254.07	2854.55	8410.53	1006.30

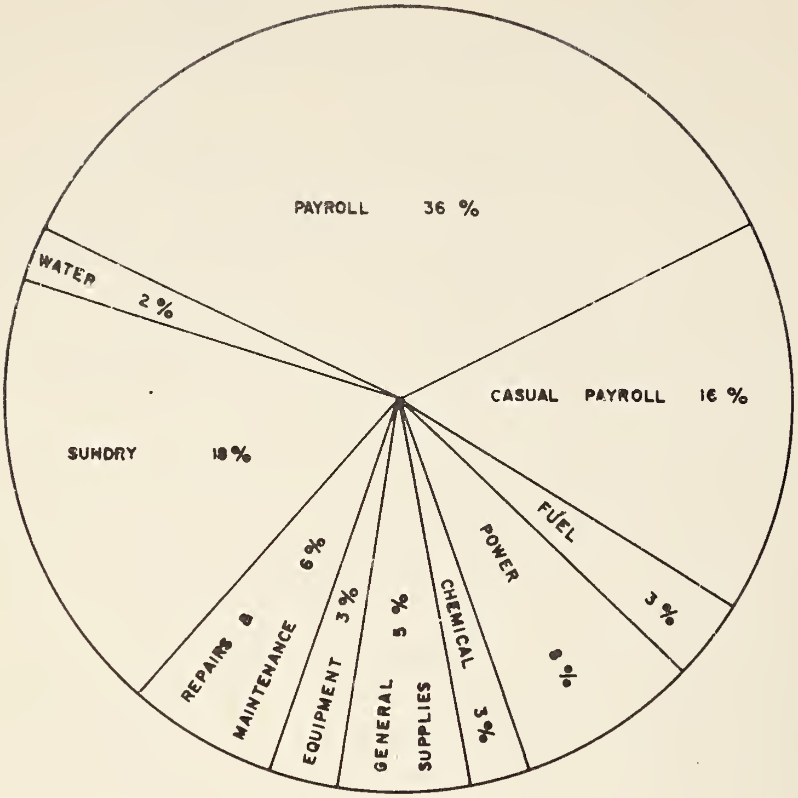
* SUNDRY INCLUDES SLUDGE HAULING COSTS WHICH WERE $3860.00

YEARLY OPERATING COSTS

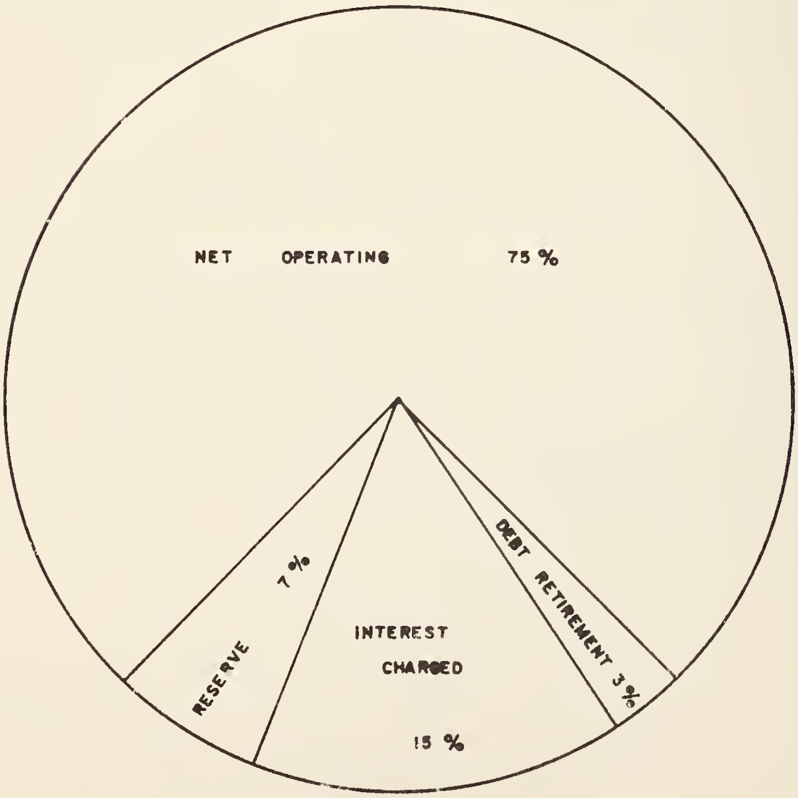
YEAR	M.G. TREATED	TOTAL COST	COST PER FAMILY PER YEAR	COST PER MILLION GALLONS	COST PER L.B. OF BOD REMOVED
1965	158.409	$26960.67	* $27.81	$170.20	16 CENTS
1966	202.882	$45931.52	$46.10	$226.40	10 CENTS

* BASED ON ANNUAL POPULATION ESTIMATE AND 3.9 PERSONS PER FAMILY

1966 OPERATING COSTS



TOTAL ANNUAL COST



Process Data

FLOWS

Flow data presenting Town sewage, Uniroyal's industrial wastes and combined wastes on a monthly average basis and on a probability basis are plotted on the accompanying graphs.

The average daily flow of Town sewage of 0.445 million gallons was 89% of the design value of 0.500 million gallons per day for municipal sewage. The design flow was exceeded 33% of the time. From the graph of average daily flows, it can be seen that the flow increased markedly during the period from March to June, indicating that there is ground water infiltration in the sanitary sewers.

The average daily flow from Uniroyal of 110,300 gallons was 61% of the design value of 180,000 gallons per day. The design flow was exceeded 25% of the time.

The average daily flow received at the plant, combined Town and industrial wastes, of 0.556 million gallons was 82% of the design value of 0.680 million gallons per day. The design flow was exceeded 25% of the time.

OPERATING SUMMARY

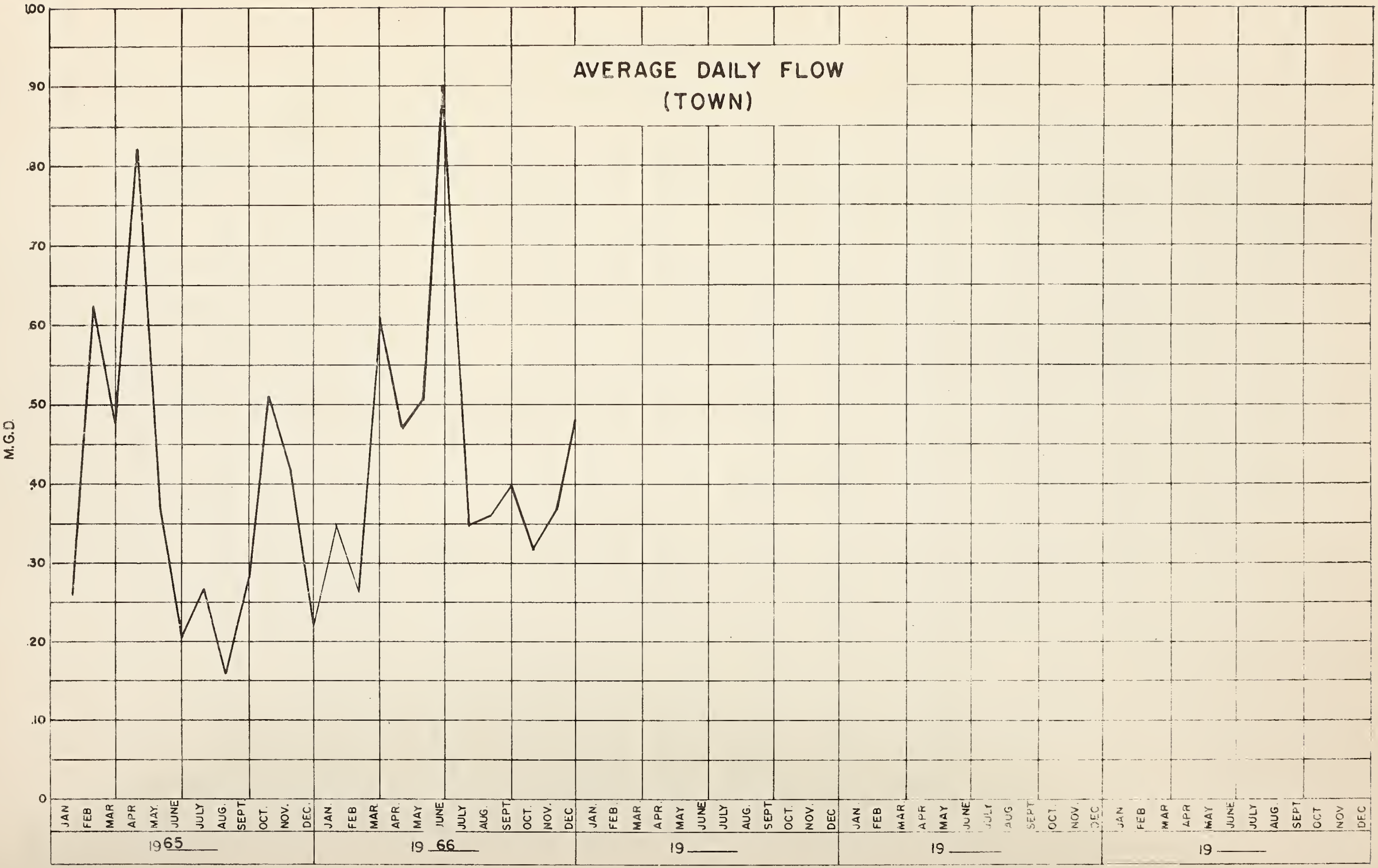
Week Ending	TOWN			UNIROYAL			COMBINED				
							Raw			Final	
	Flow	BOD	SS	Flow	BOD	SS	Flow	BOD	SS	BOD	SS
Jan. 1	0.496			0.0			0.496				
8	3.518	80	118	0.006	1700	*	3.524	104	209	23	62
15	2.814	103	228	0.021	1225	296	2.835	82	*	28	112
22	1.944	61	340	0.049	740	310	1.993	79	182	30	87
29	1.611	750	*	0.252	350	640	1.863			190	*
Feb. 5	1.445	120	*	0.434	*	854	1.879	220	556	180	580
12	1.537	170	*	0.616	325	*	2.153	220	*	180	420
19	1.770	48	66	0.868	600	392	2.638	140	182	78	99
26	2.728	225	208	0.921	1160	592	3.649	340	482	38	132
Mar. 5	3.813	115	151	0.805	530	319	4.618	285	237	99	92
12	4.783	96	118	0.817	825	82	5.600	75	144	28	85
19	5.161	70	99	1.151	545	240	6.312	270	120	48	97
26	3.523			0.866			4.389				
Apr. 2	2.779	113	117	0.839	797	92	3.618	380	120	109	81
9	3.068	98	128	0.672	280	218	3.740	108	86	225	116
16	3.047	160	106	0.628	570	93	3.675	278	151	132	65
23	3.733	180	124	0.748	740	70	4.481	242	91	22	34
30	3.393	180	216	0.886	980	48	4.279	410	104	58	102
May 7	3.028	190	168	1.302	880	202	4.330	477	198	154	87
14	2.992	218	210	0.685	840	623	3.677	258	203	144	99
21	3.645	232	183	0.641	830	199	4.286	368	228	235	109
28	5.067	144	180	0.245	1120	43	5.312	190	152	75	84
June 4	2.571	176	174	0.748	570	126	3.319	335	124	58	45
11	6.117	156	116	1.104	1140	171	7.221	308	121	28	82
18	11.670	97	100	1.438	927	1618	13.108	179	78	20	32
25	5.373	102	80	1.337	1040	79	6.710	315	94	28	42

July 2	3.053	176	138	0.918	1838	423	3.971	435	161	21	33
9	2.619	205	177	0.852	1677	64	3.471	507	212	55	62
16	2.450	278	156	1.041	1250	170	3.491	480	158	34	58
23	2.182	153	155	1.123	767	75	3.305	448	153	27	65
30	2.306	290	311	0.953	553	85	3.259	323	221	27	84
Aug. 6	2.466	119	148	0.0			2.466			20	36
13	2.715	120	194	0.0			2.715			8	18
20	2.331	192	228	1.113	540	98	3.444	115	96	10	35
27	2.516	66	107	0.444	387	57	2.960	333	126	26	18
Sept. 3	2.247	187	164	0.382	863	39	2.629	303	170	10	50
10	3.515	115	192	0.574	225	42	4.089	180	196	29	50
17	2.662	162	179	0.718	557	94	3.380	327	249	26	55
24	2.610	122	197	0.888	693	77	3.498	407	187	30	77
Oct. 1	2.293	79	81	0.475	820	49	2.768	278	129	19	40
8	2.278	156	237	0.395	607	41	2.673	263	228	23	59
15	3.010	215	159	0.840	390	50	3.850	250	126	16	73
22	1.988	208	144	0.840	515	36	2.828	330	146	46	53
29	1.776	288	117	0.840	570	45	2.616	422	108	130	92
Nov. 5	1.840	247	275	0.840	660	33	2.680	408	245	118	75
12	3.051	93	141	0.840	573	59	3.891	322	121	77	48
19	2.419	110	167	0.840	523	57	3.259	248	146	41	59
26	2.329	130	249	1.210	593	181	3.539	287	195	39	75
Dec. 3	2.830	121	97	1.211	482	62	4.041	373	199	37	69
10	4.163	97	150	1.281	800	78	5.444	443	120	68	85
17	4.521	82	113	1.323	633	97	5.844	280	157	93	88
24	2.853	100	100	1.210	670	138	4.063	292	120	144	132
31	1.972	215	212	1.031	740	42	3.003	338	204	98	108
Avg.		154	163		777	185		301	171	60	76

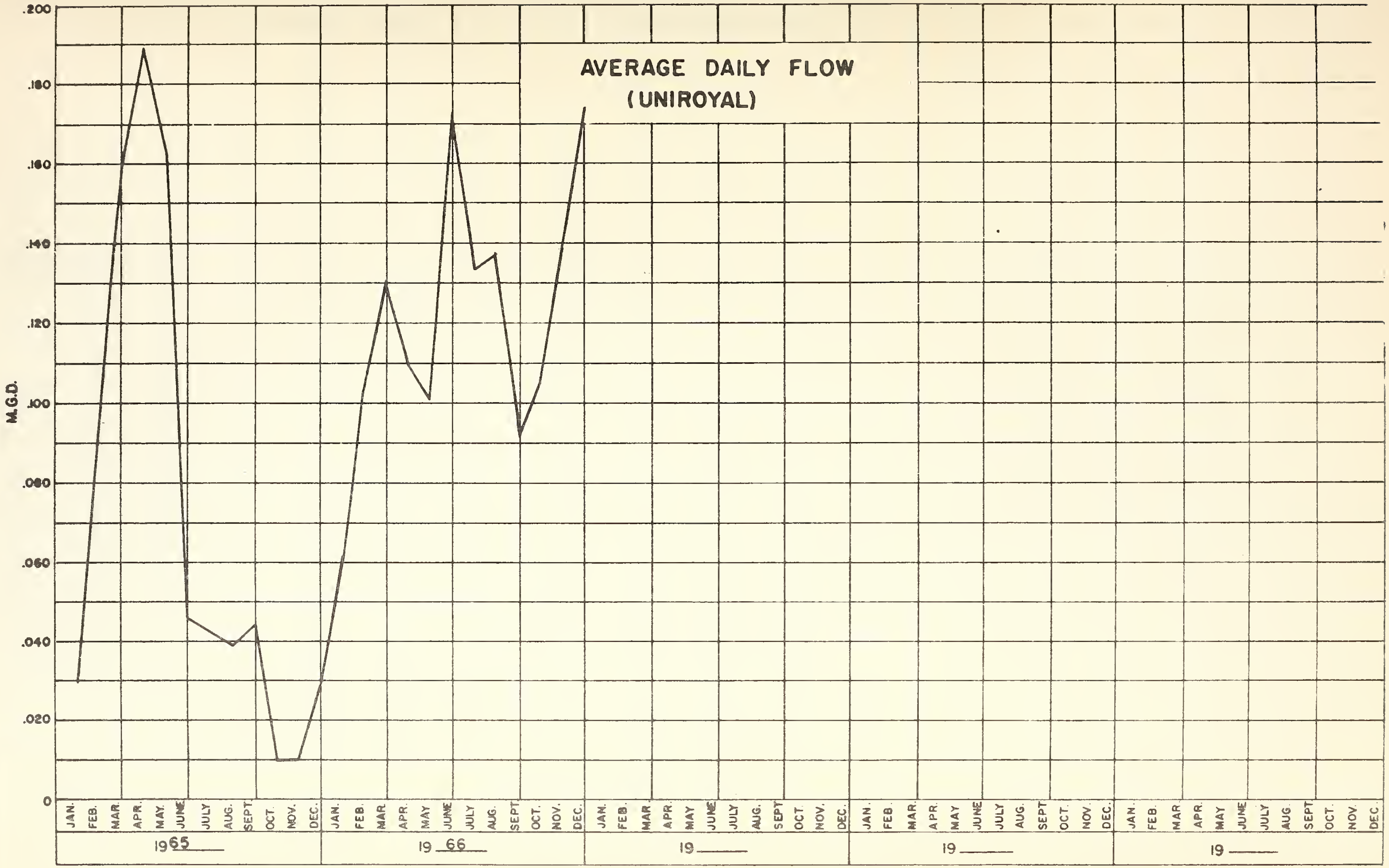
Total Flows 1966	202.882
Town	162.621
Uniroyal	40.261

* Samples exhausted, no further determinations made.

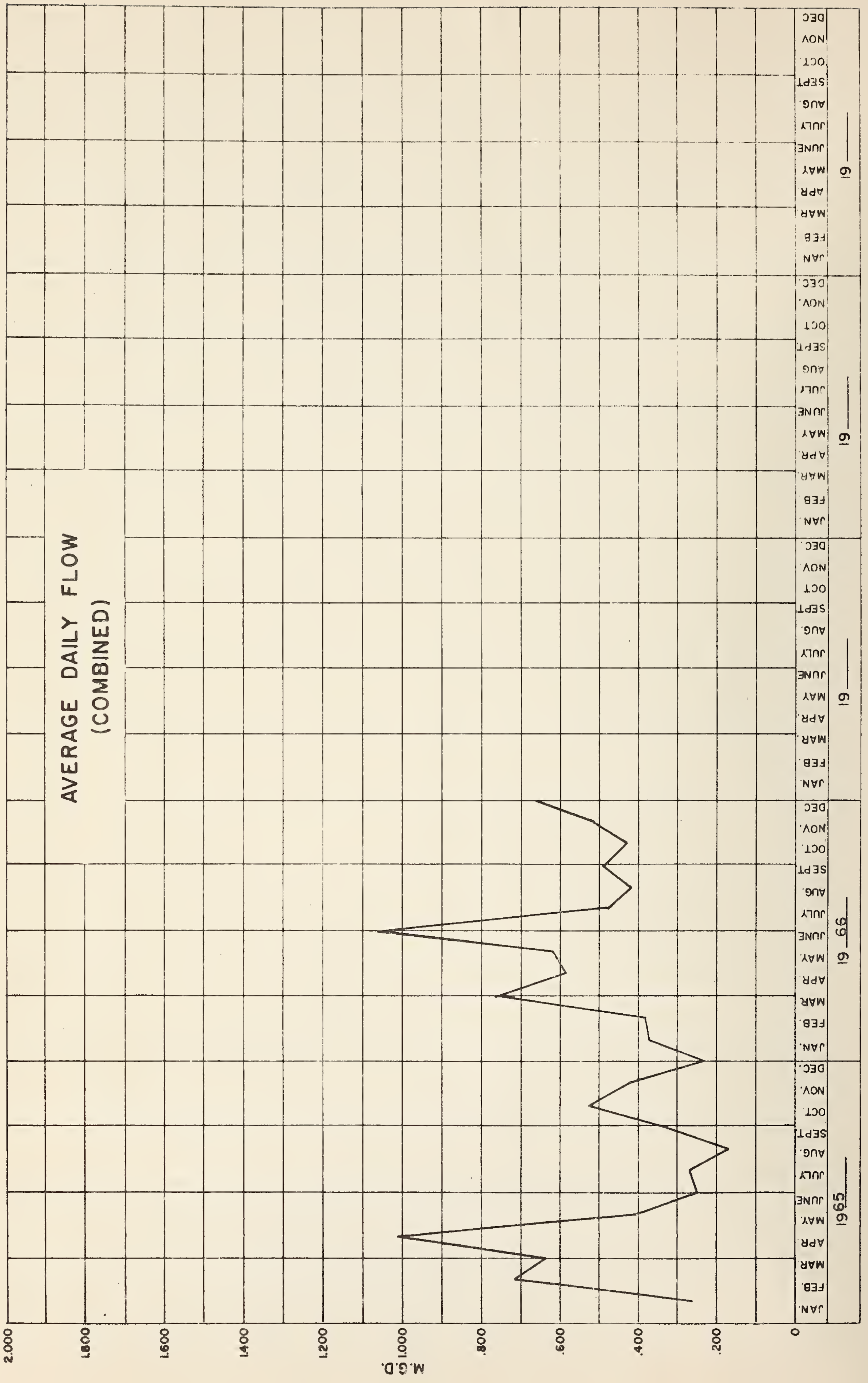
Averages include all samples taken



AVERAGE DAILY FLOW
(TOWN)



AVERAGE DAILY FLOW
(UNIROYAL)


AVERAGE DAILY FLOW
(COMBINED)
M.G.D.
2.000
1.800
1.600
1.400
1.200
1.000
.800
.600
.400
.200
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JAN.
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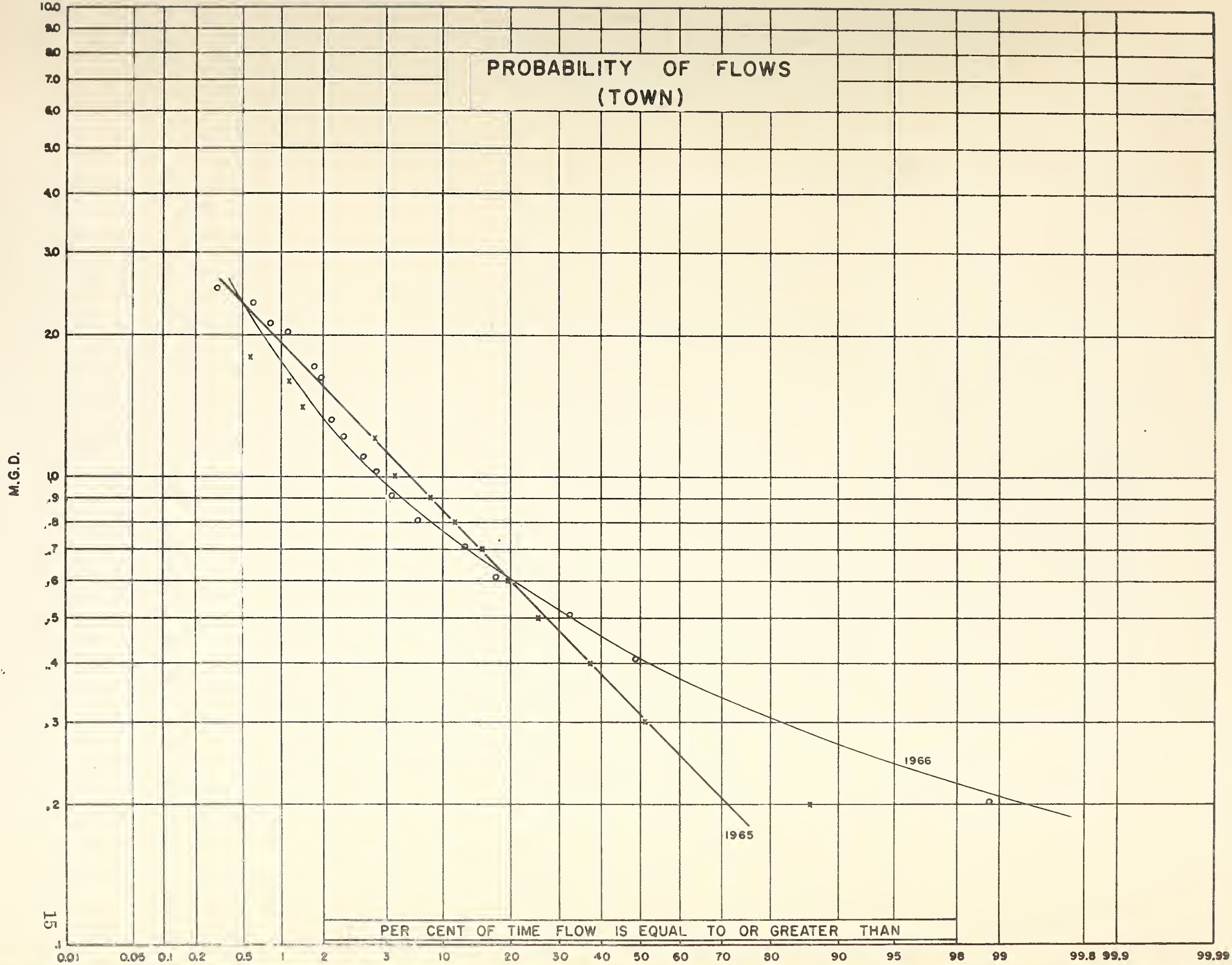
MAR.
APR.
MAY.
JUNE
JULY
AUG.
SEPT.
OCT.
NOV.
DEC.
1965
19 66
19
19
19


PROBABILITY OF FLOWS
(TOWN)
M.G.D.
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
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.1
PER CENT OF TIME FLOW IS EQUAL TO OR GREATER THAN
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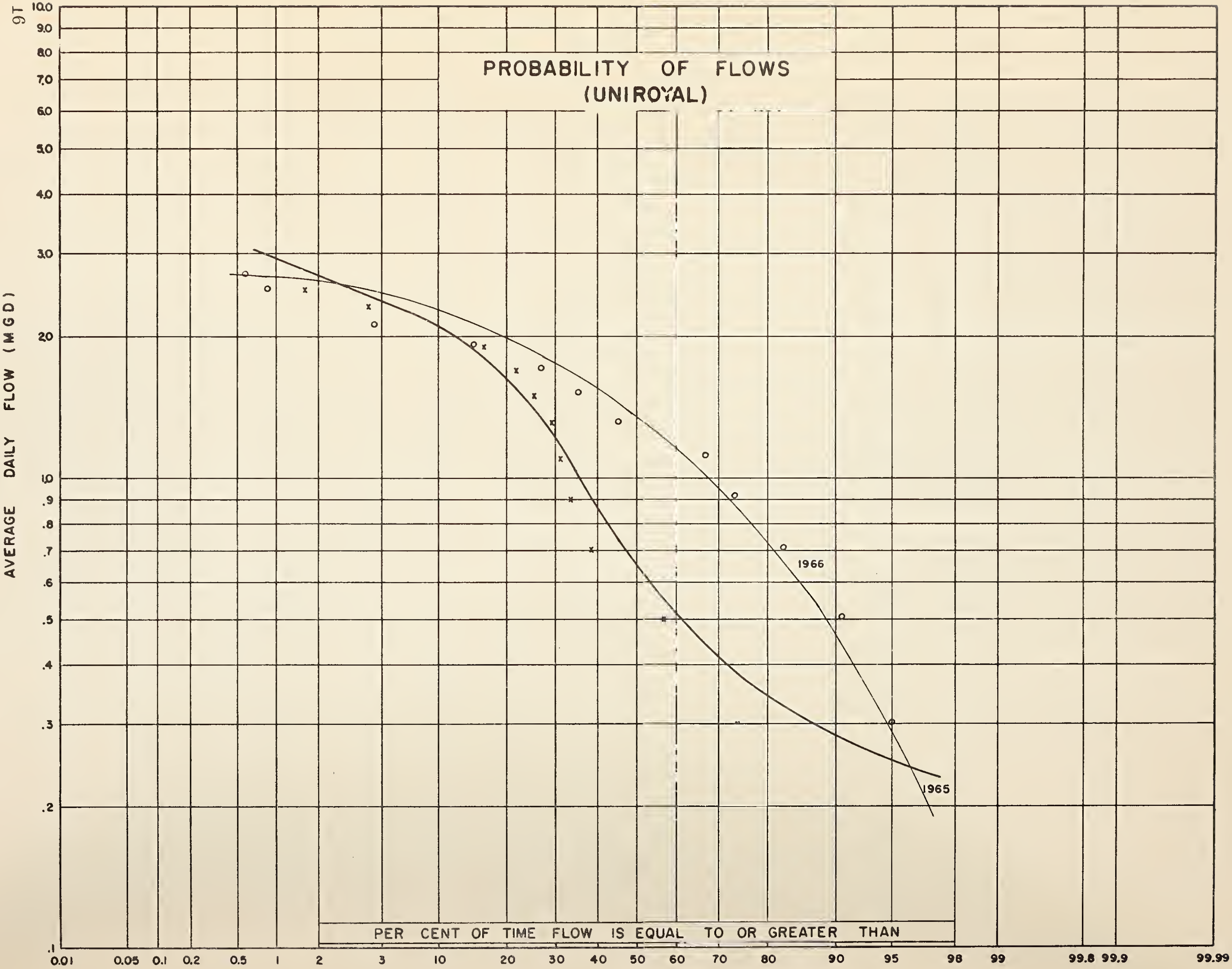
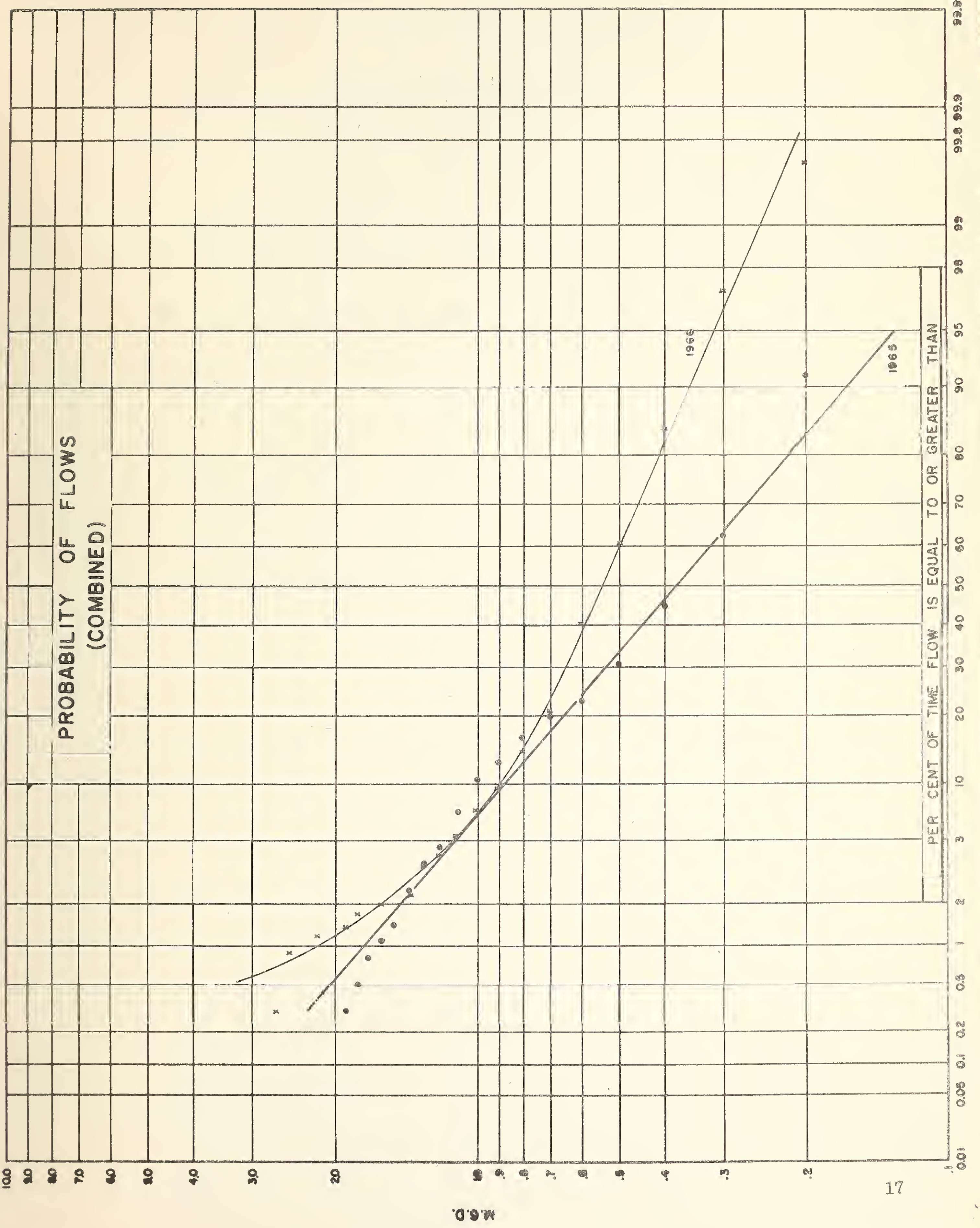
98
99
99.8
99.9
99.99
1965
1966


PROBABILITY OF FLOWS
(UNIROYAL)


PROBABILITY OF FLOWS
(COMBINED)
1966
1965
PER CENT OF TIME FLOW IS EQUAL TO OR GREATER THAN
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M.G.D.
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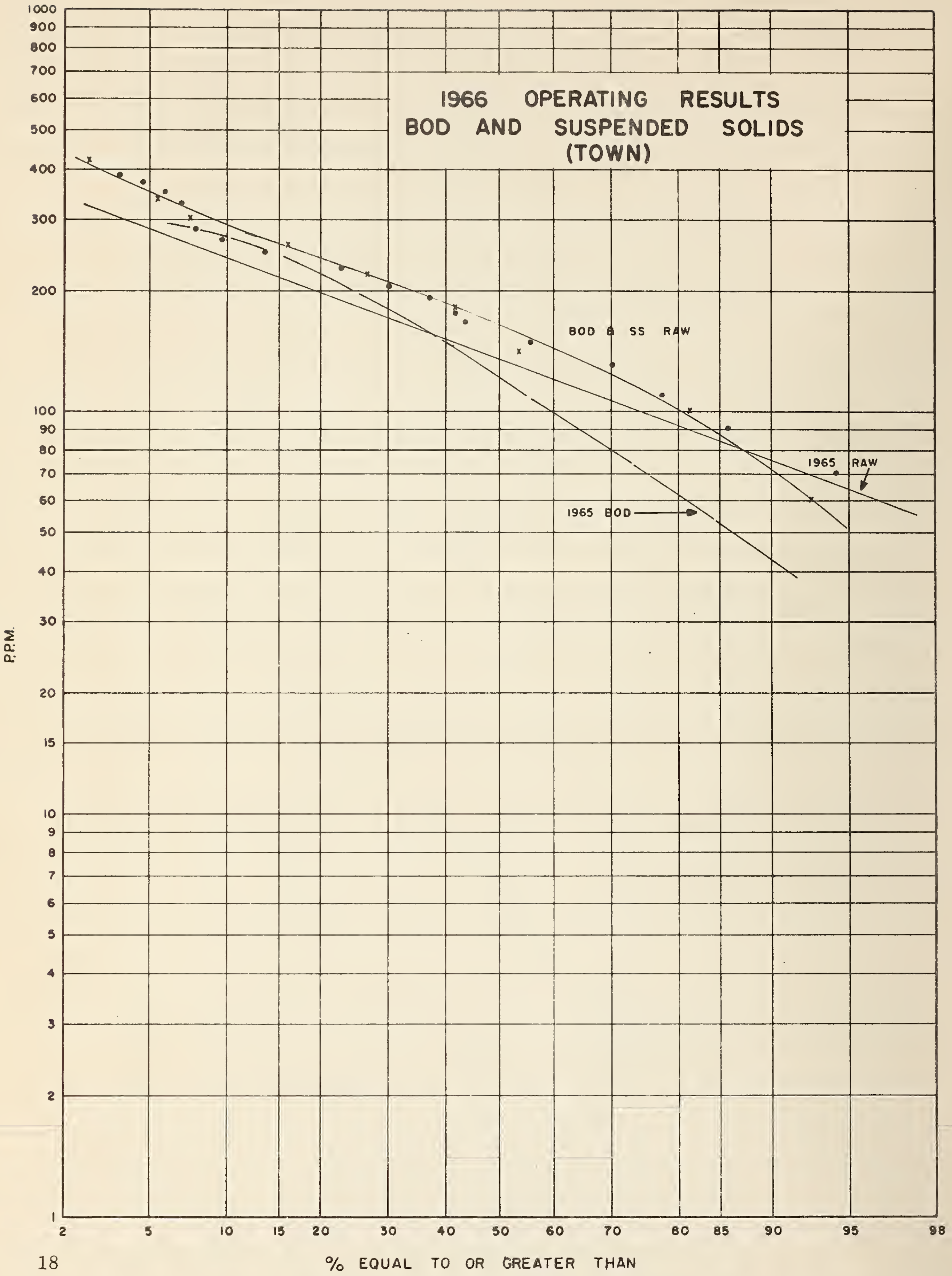
1966 OPERATING RESULTS
BOD AND SUSPENDED SOLIDS
(TOWN)
BOD & SS RAW
1965 RAW
1965 BOD
P.P.M.
1000
900
800
700
600
500
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300
200
100
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80
70
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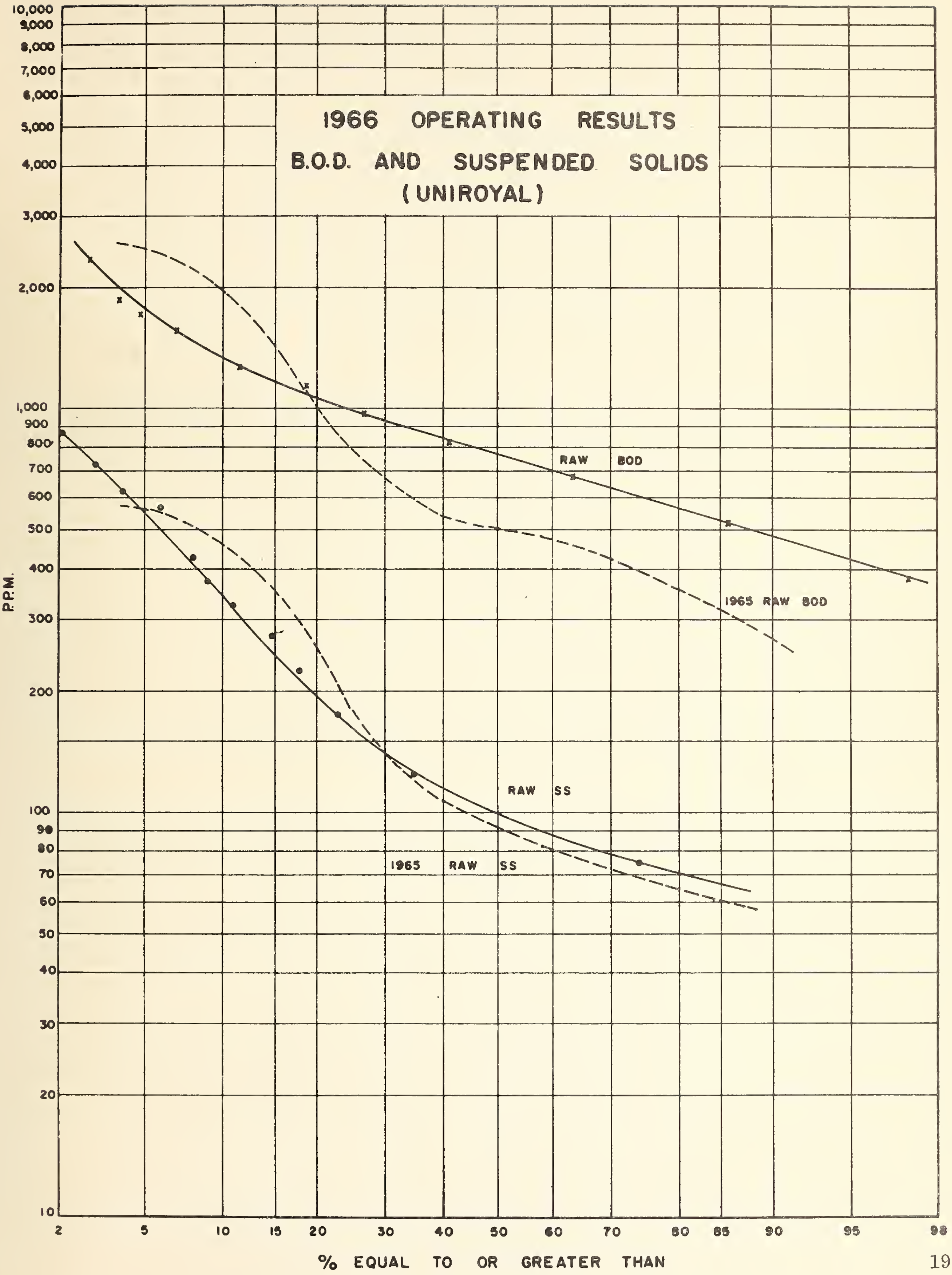
% EQUAL TO OR GREATER THAN

1966 OPERATING RESULTS
B.O.D. AND SUSPENDED SOLIDS
(UNIROYAL)
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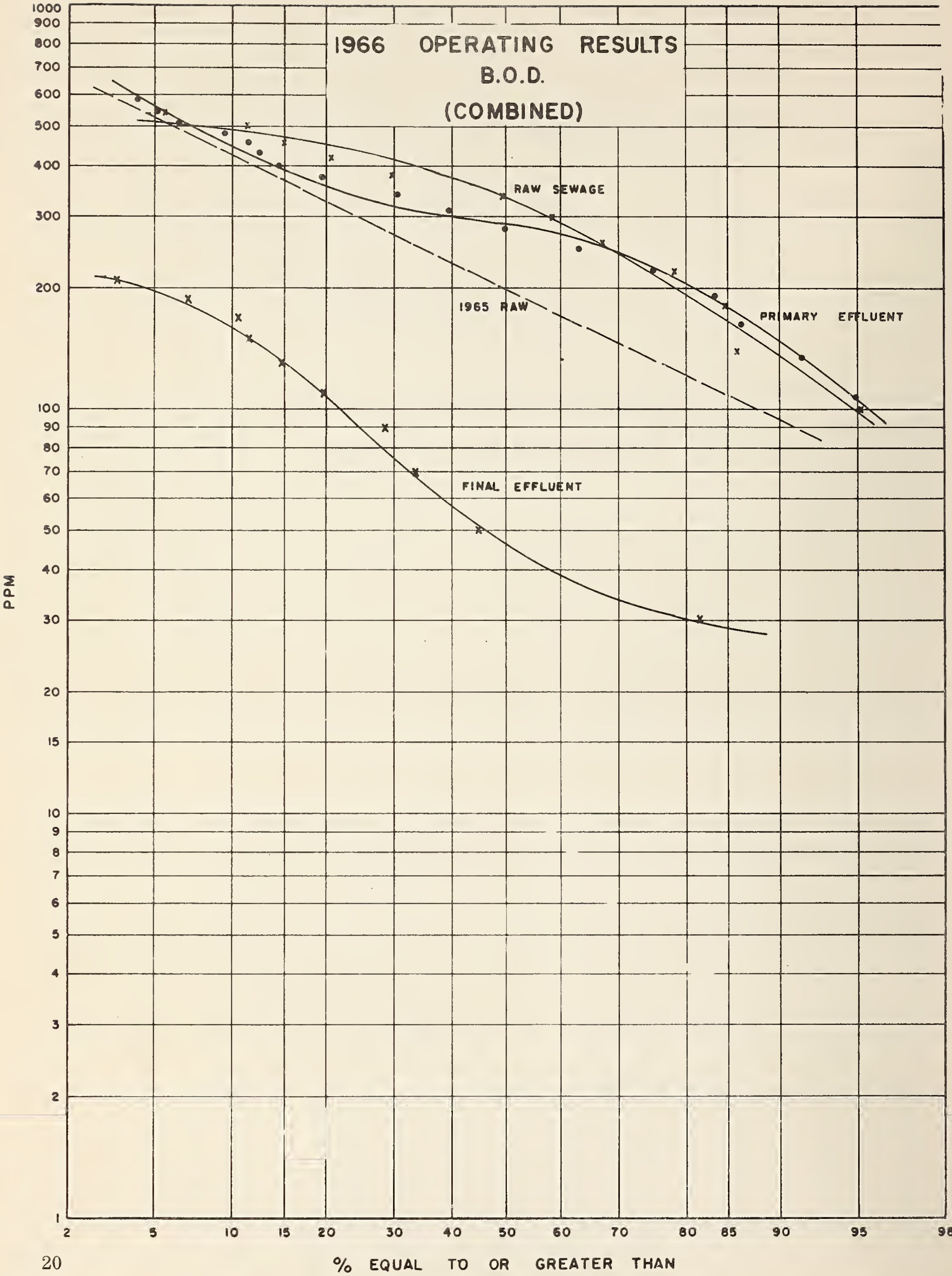
% EQUAL TO OR GREATER THAN
RAW BOD
1965 RAW BOD
RAW SS
1965 RAW SS


1966 OPERATING RESULTS
B.O.D.
(COMBINED)
RAW SEWAGE
1965 RAW
PRIMARY EFFLUENT
FINAL EFFLUENT
PPM
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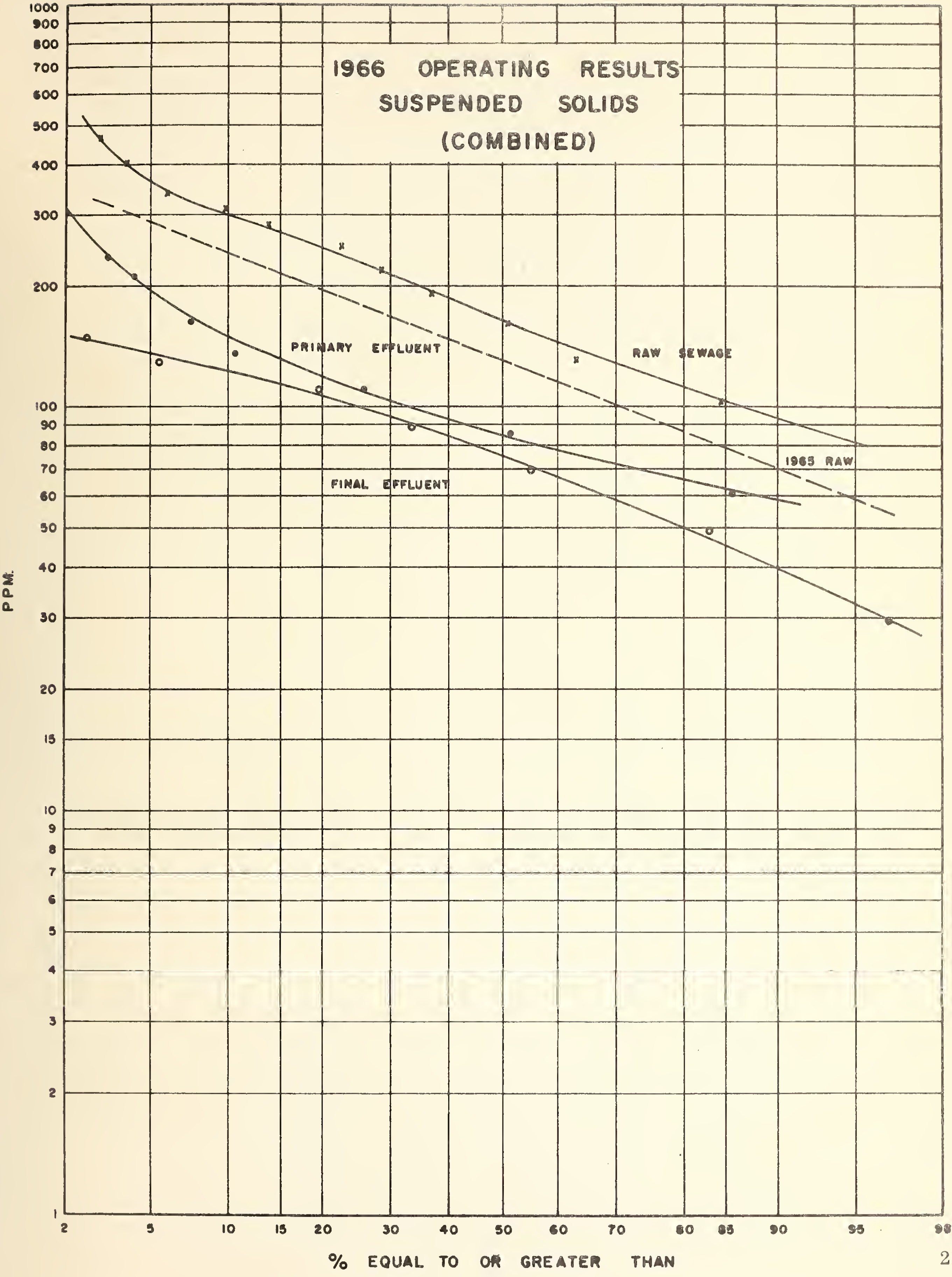
% EQUAL TO OR GREATER THAN


1966 OPERATING RESULTS
SUSPENDED SOLIDS
(COMBINED)
RAW SEWAGE
PRIMARY EFFLUENT
1965 RAW
FINAL EFFLUENT
PPM.
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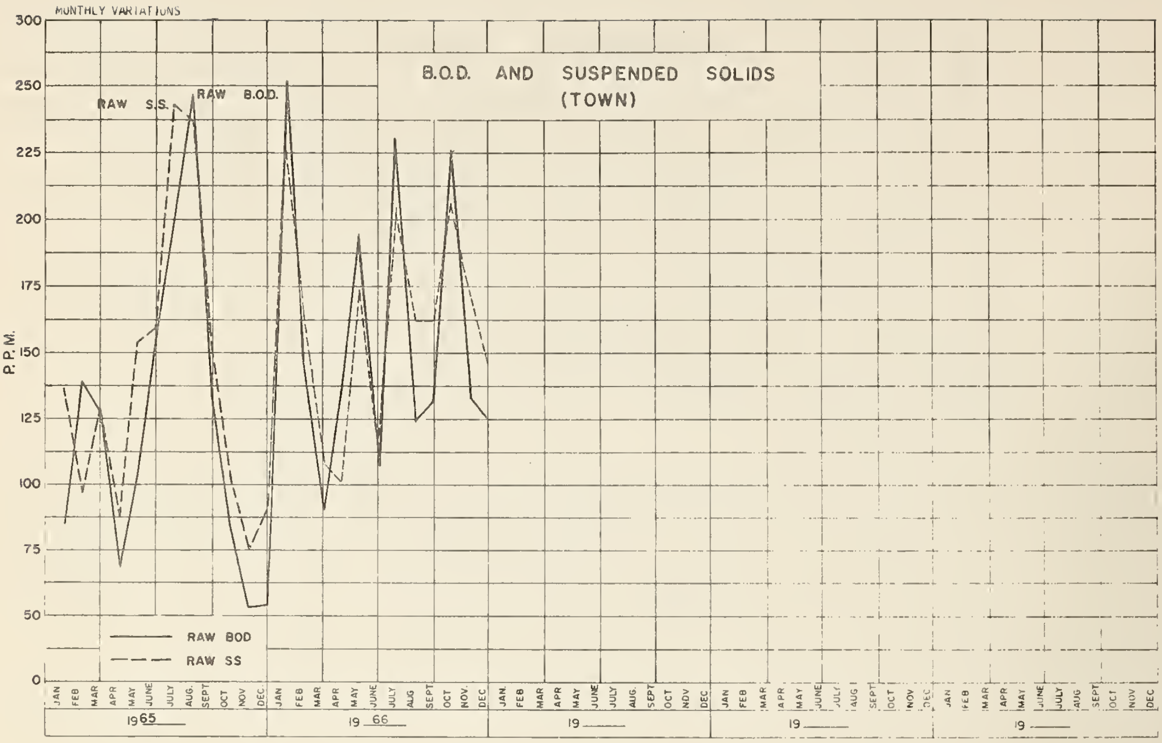
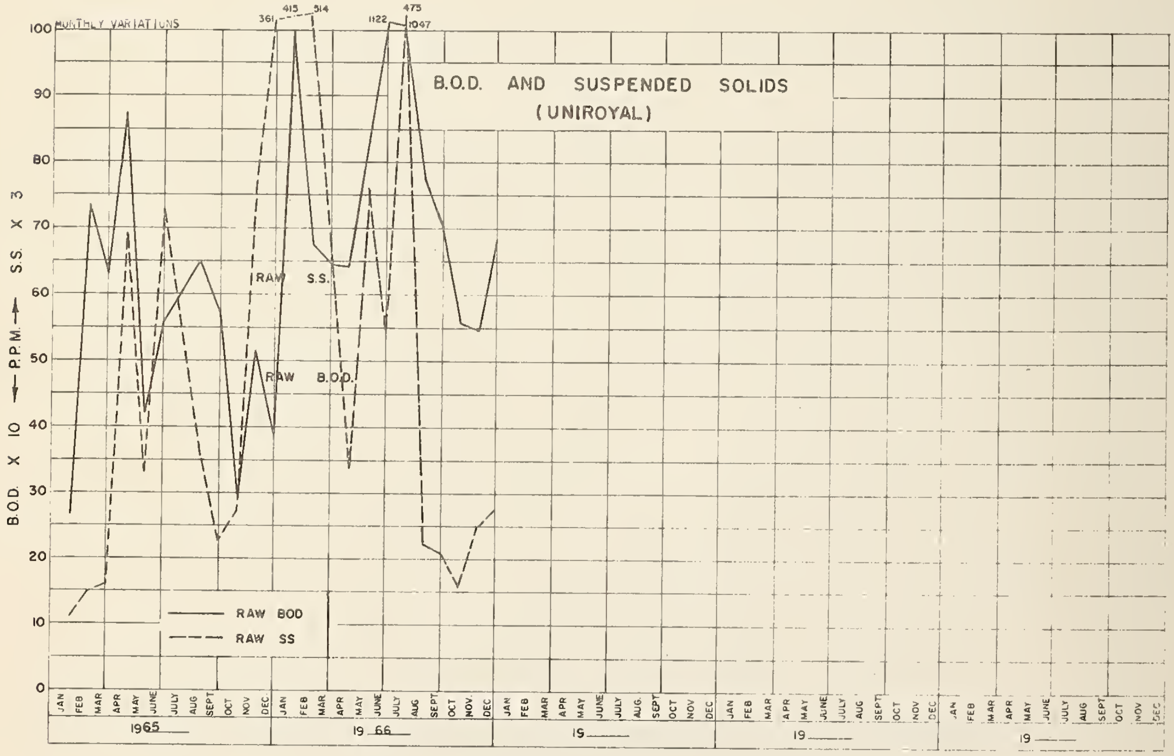
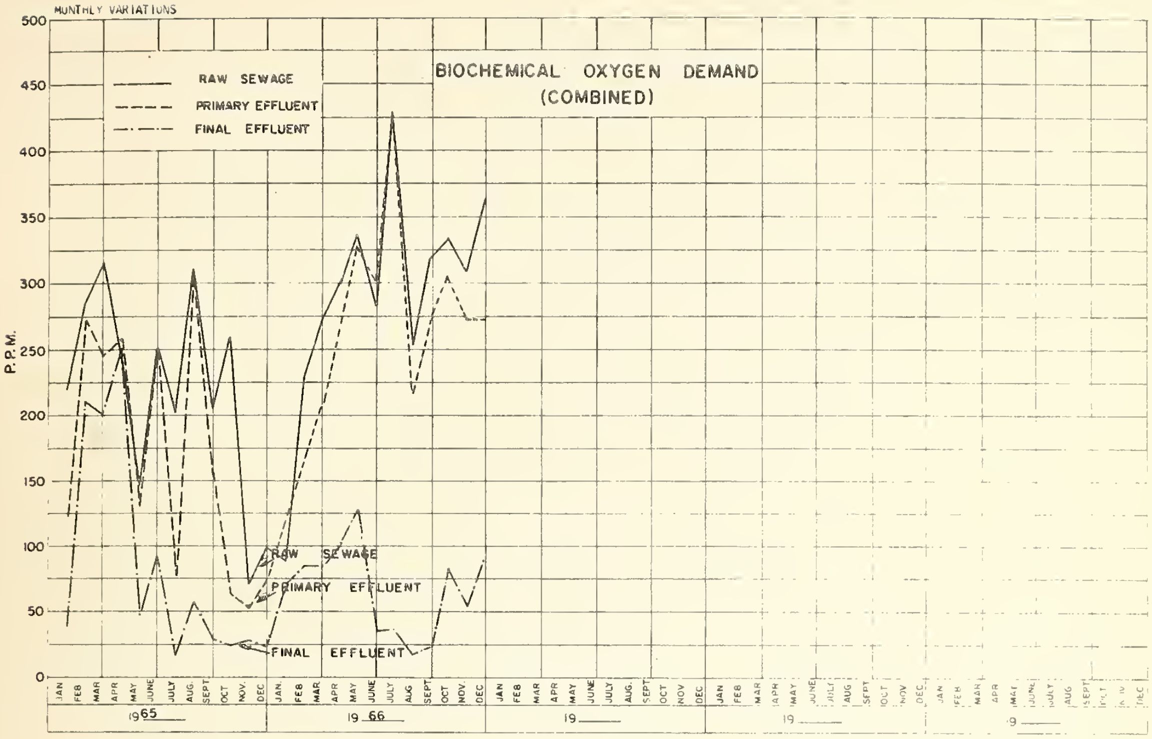
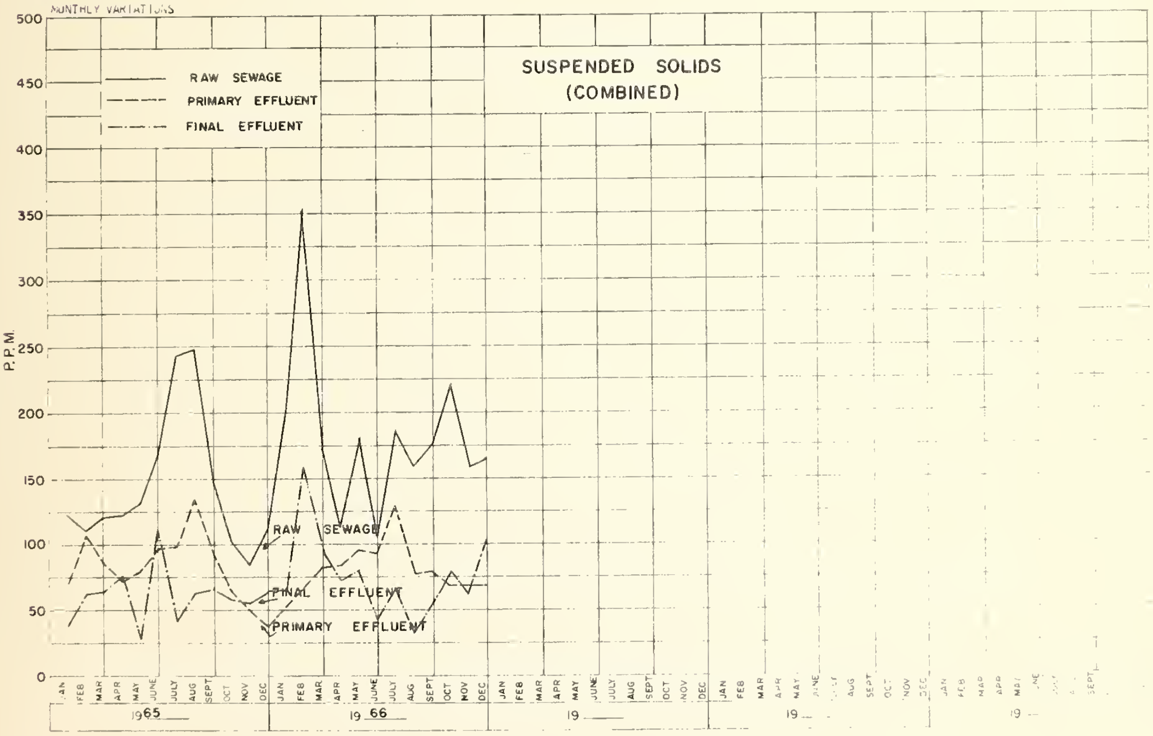
% EQUAL TO OR GREATER THAN


MONTHLY VARIATIONS
B.O.D. AND SUSPENDED SOLIDS
(TOWN)
P.P.M.
300
250
225
200
175
150
125
100
75
50
0
RAW S.S.
RAW B.O.D.
RAW BOD
RAW SS
JAN FEB MAR APR MAY JUNE JULY AUG. SEPT OCT NOV DEC
1965
19 66
19
19
19


MONTHLY VARIATIONS
B.O.D. AND SUSPENDED SOLIDS
(UNIROYAL)
B.O.D. X 10 ← P.P.M. → S.S. X 3
100
90
80
70
60
50
40
30
20
10
0
361
415
514
1122
475
1047
RAW S.S.
RAW B.O.D.
RAW BOD
RAW SS
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC
1965
19 66
19
19
19


MONTHLY VARIATIONS
BIOCHEMICAL OXYGEN DEMAND
(COMBINED)
RAW SEWAGE
PRIMARY EFFLUENT
FINAL EFFLUENT
P.P.M.
500
450
400
350
300
250
200
150
100
50
0
RAW SEWAGE
PRIMARY EFFLUENT
FINAL EFFLUENT
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC
1965
1966
19


MONTHLY VARIATIONS
SUSPENDED SOLIDS
(COMBINED)
RAW SEWAGE
PRIMARY EFFLUENT
FINAL EFFLUENT
P.P.M.
500
450
400
350
300
250
200
150
100
50
0
RAW SEWAGE
FINAL EFFLUENT
PRIMARY EFFLUENT
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC
1965
1966
19

GRIT, BOD AND SS REMOVAL

Total tons removed:	BOD	221.0
	Suspended Solids	92.7

AVERAGES PER MONTH

	Influent	Effluent	% Reduction	Tons Removed
BOD	301	60	80.0	18.4
Suspended Solids	171	76	55.5	7.7

COMMENTS

The BOD and suspended solids reductions during the year were low, averaging 80 percent and 55.5 percent respectively. Difficulty was experienced in treating the industrial wastes received at the plant.

GRIT, B.O.D AND S.S. REMOVAL – COMMENTS

BOD and suspended solids data for Town sewage, Uniroyal wastes and combined wastes are presented on a monthly average basis and on a probability basis on the accompanying graphs.

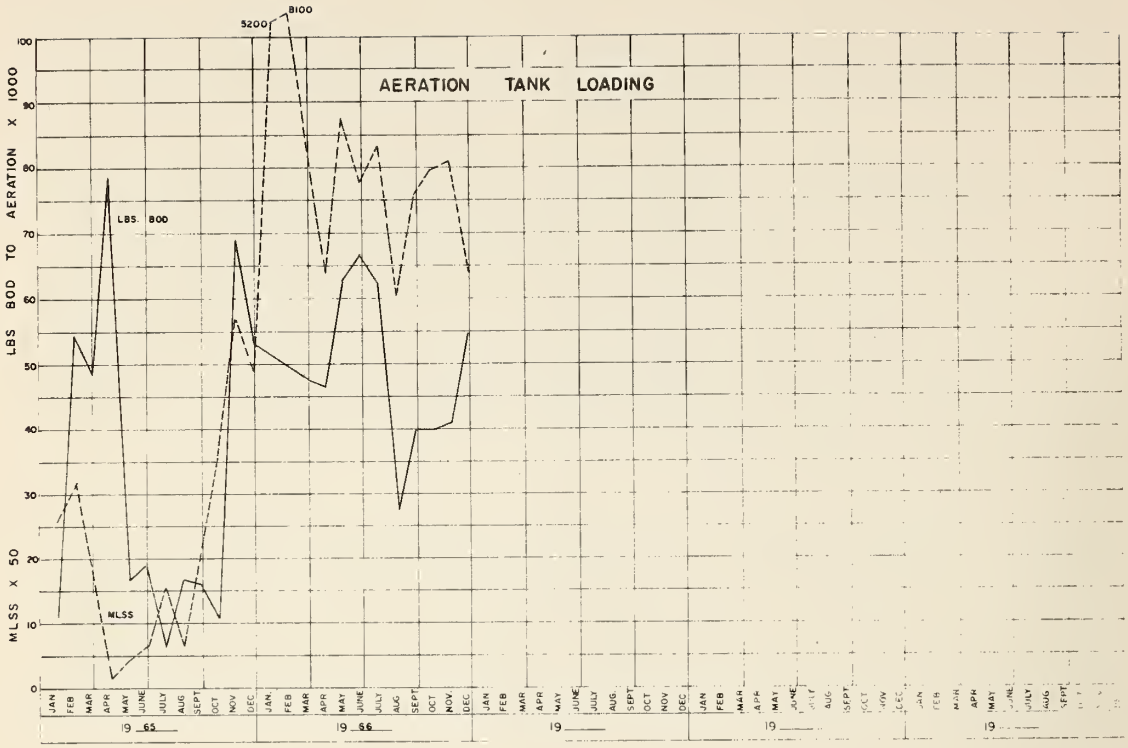
The average BOD concentration of municipal sewage was 154 ppm, 91 percent of the design concentration of 170 ppm, with values ranging from a minimum of 48 ppm to a maximum of 750 ppm. The BOD design concentration was exceeded 45 percent of the time. The BOD loading, measured as the quantity of BOD received, was 81 percent of the design loading. The average suspended solids concentration of Town sewage was 163 ppm 54% of the design value, with a range from 66 ppm to 340 ppm. The design concentration of 300 ppm for suspended solids was exceeded 9 percent of the time. The suspended solids loading due to municipal wastes was 49 percent of the design loading.

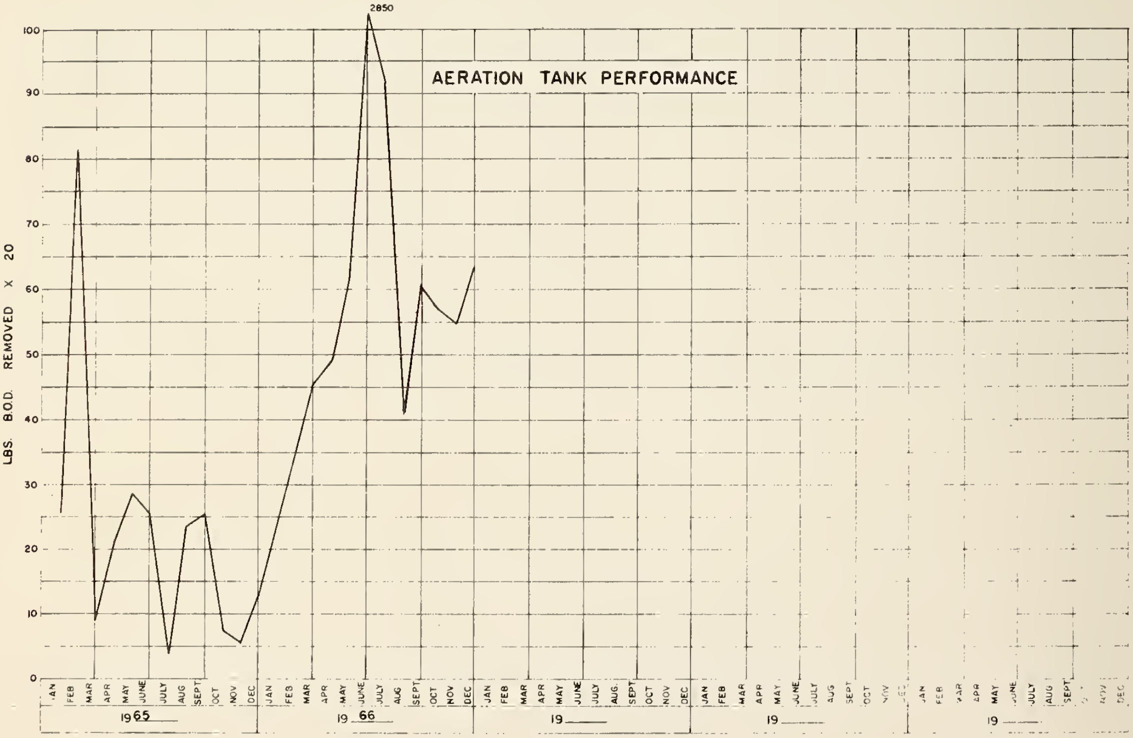
The average BOD concentration of Uniroyal wastes of 777 ppm was 71 percent of the design value of 1100 ppm. The design concentration was exceeded 17 percent of the time. The average BOD loading due to Uniroyal wastes was 43 percent of the design loading. The average suspended solids concentration of Uniroyal wastes was 185 ppm, 58 percent of the design value of 320 ppm. The design concentration for suspended solids was exceeded 11 percent of the time. The suspended solids loading due to the industrial wastes average 35 percent of the design value.

The average BOD concentration of the combined influent of 301 ppm was 72 percent of the design concentration. The design value of 420 ppm was exceeded 30 percent of the time. The average BOD loading during the year was 1675 pounds per day, 59 percent of the design loading. The average suspended solids concentration of the combined influent of 171 ppm was exceeded 9 percent of the time. The average suspended solids loading of 950 pounds per day was 46 percent of the design loading.

It can be seen from the graph of BOD for combined influent that there is little reduction in BOD due to primary sedimentation. The average primary effluent BOD was 286 ppm, a reduction of 5 percent.

The average plant effluent BOD and suspended solids concentrations were 60 ppm and 76 ppm respectively. The OWRC objective of 15 ppm for each was not met during the year.


AERATION TANK LOADING
LBS BOD TO AERATION X 1000
MLSS X 50
LBS. BOD
MLSS
5200
8100
0
10
20
30
40
50
60
70
80
90
100
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC
19 65
19 66
19

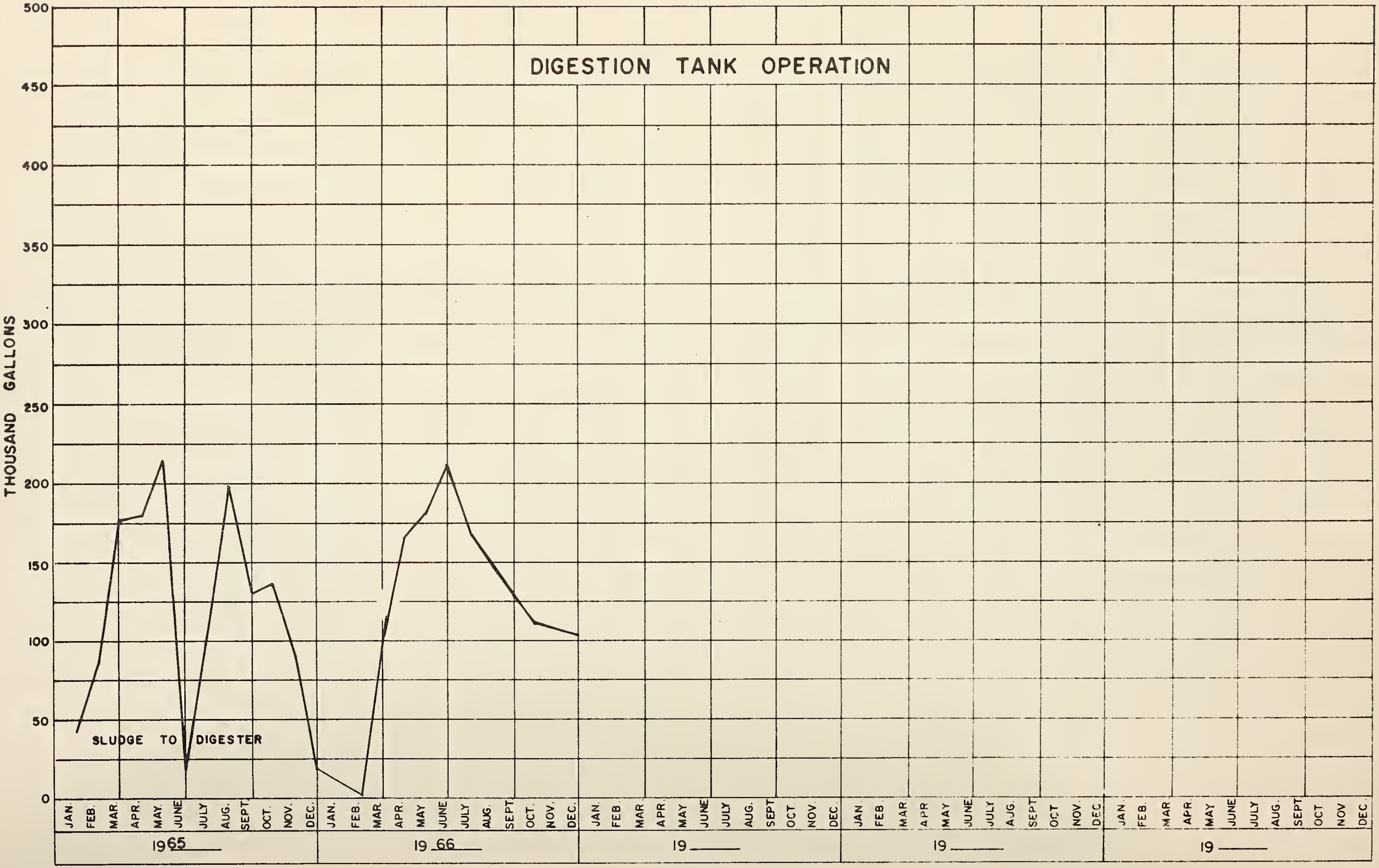

AERATION TANK PERFORMANCE
LBS. B.O.D. REMOVED X 20
2850
0
10
20
30
40
50
60
70
80
90
100
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC
1965
19 66
19

MONTH	PRIM. EFFL B.O.D. P.P.M.	M.L.S.S. P.P.M.	LBS. B.O.D. PER 100 LBS. M. L. S. S.
JANUARY	-	5211	-
FEBRUARY	-	6137	-
MARCH	206	4268	15
APRIL	268	3162	20
MAY	329	4387	17
JUNE	300	3868	33
JULY	422	4155	16
AUGUST	212	3016	9
SEPTEMBER	273	3792	12
OCTOBER	303	3981	11
NOVEMBER	272	4042	11
DECEMBER	273	3142	19
TOTAL	-	-	-
AVERAGE	286	4097	16

COMMENTS

Throughout the year the aeration section was not able to treat wastes being received effectively. An examination of the effluent BOD concentrations indicates that the degree of treatment is dependent upon temperature. During the summer months there was a pronounced improvement in the quality of the effluent.

In order to maintain a high concentration of aerobic organisms in the aeration section, raw sludge from the Waterloo WPCP was added periodically to provide the necessary nutrients.


DIGESTION TANK OPERATION
THOUSAND GALLONS
500
450
400
350
300
250
200
150
100
50
0
SLUDGE TO DIGESTER
JAN. FEB. MAR. APR. MAY. JUNE JULY AUG. SEPT. OCT. NOV. DEC.
1965
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT OCT. NOV. DEC.
19 66
JAN. FEB. MAR APR MAY JUNE JULY AUG. SEPT OCT NOV. DEC.
19
JAN. FEB. MAR APR MAY JUNE JULY AUG. SEPT OCT NOV. DEC
19
JAN. FEB. MAR APR. MAY JUNE JULY AUG. SEPT OCT NOV DEC.
19

DIGESTER OPERATION

MONTH	SLUDGE TO DIGESTERS			SLUDGE FROM DIGESTERS			GAS PRODUCED 1000'S Cu. Ft.
	1000'S CU. FT.	% SOLIDS	% VOL. MAT.	1000'S CU. FT.	% SOLIDS	% VOL. MAT	
JAN	-	-	-	-	-	-	-
FEB.	0.20	-	-	-	-	-	-
MAR.	16.43	-	-	-	-	-	-
APR.	26.47	-	-	-	-	-	-
MAY	28.87	-	-	0.48	-	-	-
JUNE	34.03	-	-	-	-	-	-
JULY	26.58	4.90	2.65	-	-	-	-
AUG.	23.34	-	-	-	-	-	-
SEPT.	20.56	-	-	-	-	-	-
OCT.	17.93	1.65	0.95	-	-	-	-
NOV.	16.96	2.38	1.50	-	-	-	-
DEC.	16.75	2.32	1.46	-	-	-	-
TOTAL	228.12	-	-	0.48	-	-	-
AVG.	19.01	2.81	1.64	-	-	-	-

COMMENTS

Following clean-out and repair of the digester, it was filled with water, heated, and seeded with digested sludge from the Kitchener WPCP. Even under these optimum conditions for sludge digestion, very little methane gas was produced when sludge from the primary clarifiers was added.

Since the contents of the digester were mainly water, which was returned as supernatant to the process, very little sludge was hauled away.

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (P.P.M)
JANUARY	11.231	820	7.30
FEBRUARY	10.237	617	6.03
MARCH	22.986	625	2.72
APRIL	17.288	599	3.46
MAY	18.880	599	3.17
JUNE	32.138	575	1.85
JULY	14.683	521	3.55
AUGUST	12.772	430	3.37
SEPTEMBER	14.522	463	3.19
OCTOBER	13.061	483	3.70
NOVEMBER	15.031	458	3.05
DECEMBER	20.053	471	2.35
TOTAL	202.882	6681	-
AVERAGE	16.907	557	3.29

COMMENTS

During the year, 6681 pounds of chlorine were used to chlorinate the final effluent. The objective was to maintain a chlorine residual of 0.5 ppm for a 15 minute period. Difficulty was experienced at times in determining the chlorine residual because chemicals in the effluent interfered with the chemicals used in the chlorine residual determinations.

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CONCLUSIONS

The plant provided substandard treatment throughout most of the year. High flows caused by storm water sewer infiltration, and the nature of the industrial wastes, were the major contributing factors in preventing the plant from efficiently treating the wastes received.

RECOMMENDATIONS

In order to improve the quality of the effluent and increase the efficiency of operation, it is recommended:

1. That the Town take the necessary steps to solve the storm water sewer infiltration problem further;

2. That the Town continue to control the volume of fibres reaching the plant, and

3. That Uniroyal continue to use the stabilization ponds to provide an industrial waste of a uniform quality, obviating shock loads.

Since the digesters do not function properly, and the amount of solids removed by the primary clarifiers is small, it is also recommended that the digesters be operated as unheated holding tanks.

DATE DUE

TD/227/E55/W38/1966/MOE
Ontario Water Resources Co
Elmira water
pollution control plant: asvy
1966 operating c.1 a aa
summary

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ONTARIO WATER RESOURCES COMMISSION